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II.—*On a specimen of Canadian Native Platinum from British Columbia.*

By G. CHRISTIAN HOFFMANN, F. Inst. Chem.

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The first mention made of the finding of native platinum in Canada is that by Dr. T. Sterry Hunt, in the Report of Progress of the Geological Survey of Canada, for the year 1851-52 (p. 120.) He there states that it had been observed by him in the form of minute scales and grains—together with small tin-white plates, generally hexagonal in form, of osmiridium—in the gold washings of the Rivière du Loup, near its junction with the Chaudière, Fief St. Charles, seigniory of Aubert de l'Isle; also, that specimens of both these metals had been handed to him, which were said to have been found in the gold washings of the Rivière des Plantes, in the neighbouring seigniory of Rigaud Vaudreuil, which, together with that of Aubert de l'Isle, is in the County of Beauce, Province of Quebec.

It has, according to Dr. G. M. Dawson, since been met with, in association with alluvial gold, in several localities in the Province of British Columbia, as for instance on the Fraser River, about ten miles below Lillooet; on Tranquille River flowing into Kamloops Lake; about three and a half miles above Vermilion Forks on the South Similkameen, and on Granite Creek, a branch of the Tulameen or North Fork of the Similkameen River. On the South Similkameen, the gold and platinum occur in rather fine scales; but, on Granite Creek, much heavier gold is found, and the associated platinum is also in a much coarser form. The relative proportion of platinum to gold, as occurring at these places, cannot be accurately stated; it is, however, inferred that the platinum forms but a small proportion of the whole. Dr. G. M. Dawson informs me that there is every reason to believe that the gold and associated platinum of the two last named localities are derived from veins or other deposits, occurring in a series of schistose dioritic and felspathic rocks which flank the granites and gneisses of the Cascade or Coast Range at this point; that these rocks, which are largely volcanic in origin, but have since undergone much alteration, are with little doubt of Palæozoic, and perhaps partly of Mesozoic age.

The specimen under consideration is from Granite Creek, and was very generously furnished to the Geological Survey by Mr. T. Elwyn, Deputy Provincial Secretary of British Columbia.

It weighed 18.266 grams; of this, 17.894 grams consisted of native platinum, and the balance of magnetite, rock-matter, a little pyrite, and a few flakes of gold—the latter of deep yellow color. The composition of the material was as follows:—



Native platinum.....	97.963
Gold.....	0.225
Pyrite	0.219
Rock matter.....	1.593
	100.000

The platinum was in the form of grains and pellets, varying in size from half a millimetre to eight millimetres in diameter, and in weight, from three milligrams to eight decigrams. The grains measuring less than one millimetre constituted but a very small proportion of the whole; there were only a few pellets measuring five millimetres, and but two measuring eight millimetres; the bulk of the material being made up of grains, varying in size from one to four millimetres in diameter. The grains, which were very much rounded off, as though from attrition, had a lead-grey color and sub-metallic lustre, they were all more or less tarnished, and the greater number contained inclusions of chromite. A certain proportion of the same proved to be readily attracted by the magnet, and of these, all such as were tried were found to possess polarity. After treatment with dilute hydrochloric acid, which removed a little iron, the grains had a steel-grey color and metallic lustre. The particles of foreign matter having been carefully eliminated, the material, as a whole, was found to have a specific gravity¹ of 16.656.

The ore was separated by means of the magnet into two distinct portions, a non-magnetic and a magnetic; the latter constituted 37.88 per cent., by weight, of the whole

PORTION I.—Non-magnetic.

This weighed 11.115 grams, and had a specific gravity, as a whole, of 17.017. Guided by the general appearance of the grains, a further sub-division of this portion of the material was effected, the same becoming separated into three sub-portions *a*, *b* and *c*.

Sub-portion a.—Weighed 3.6798 grams, and had a specific gravity of 17.811. It was composed of irregular-shaped grains and pellets, having comparatively smooth surfaces and, so far as could be seen with the aid of a lens, quite free from any foreign inclusions. A small proportion of the grains measured one millimetre, a somewhat greater number four millimetres, the greater number two millimetres in diameter.

Sub-portion b.—Weighed 2.8576 grams, and had a specific gravity of 17.562. It was made up of very irregular-shaped grains, all of which were more or less pitted and contained a little imbedded chromite. Very few of the same measured less than one millimetre, the greater number were one millimetre, with here and there one measuring three millimetres in diameter.

Sub-portion c.—Weighed 4.5776 grams, and had a specific gravity of 16.126. The grains and pellets constituting this material were also of very irregular shape, they were all very much pitted, and contained inclusions of chromite; about one half of the same measured three millimetres, and there was almost an equal number measuring four millimetres, whilst two of the pellets measured five, and one, eight millimetres in diameter. Analyses of these sub-portions gave the following results:—

¹ Temperature, in all instances, 15.5° C.

	<i>a.</i>	<i>b.</i>	<i>c.</i>
Platinum.....	81.18	67.85	57.95
Palladium.....	0.30	0.34	0.17
Rhodium.....	2.56	4.09	2.93
Iridium	1.09	1.92	0.87
Osmium			
Copper	2.96	3.82	2.75
Iron	8.90	8.03	6.95
Osmiridium	2.17	12.50	25.96
Gangue (imbedded chromite)	1.06	1.74	2.79
	100.22	100.29	100.37
Specific gravity.....	17.811	17.562	16.126

The osmiridium of sub-portion *a* was in the form of minute steel-grey colored scales of bright metallic lustre, with an occasional microscopic, tin-white, compact grain. That of sub-portion *b* consisted of a heavy, light steel-grey colored powder, very fine steel-grey colored scales of brilliant metallic lustre, a few microscopic, tin-white, irregular shaped, compact grains, and some six or seven tin-white cavernous nodules, varying in size from two to three millimetres in diameter. Whilst that of sub-portion *c* consisted in part of a heavy, light steel-grey colored powder, some very fine steel-grey colored scales of brilliant metallic lustre, some tin-white, minute, often almost microscopic, tolerably firm skeleton aggregations of minute scales, and a few tin-white, cavernous nodules, one of which measured almost five millimetres in diameter. The grains and nodules of osmiridium amounted to about fifty-five per cent. of the whole of that constituent, and had a specific gravity of 18.742.

Adding together the weights of the material constituting the above three sub-portions, as likewise those of each of the various constituents found, calculation showed the composition of the non-magnetic portion of the ore, as a whole, to be as follows:—

Platinum	68.19
Palladium	0.26
Rhodium.....	3.10
Iridium	1.21
Osmium	
Copper	3.09
Iron	7.87
Osmiridium	14.62
Gangue (imbedded chromite)	1.95
	100.29
Specific gravity	17.017

PORTION II.—Magnetic.

Weighed 6.779 grams, and had a specific gravity, as a whole, of 16.095, and was, as already stated, magneti-polar.

Agreeably with the method of selection adopted in the case of the non-magnetic portion, this portion became separated into two sub-portions, *d* and *e*.

Sub-portion d.—Weighed 3.7037 grams, and had a specific gravity of 16.789. It was

made up of very irregular-shaped grains and pellets, a small proportion of which had perfectly smooth surfaces; the greater number, however, were more or less pitted, but none of them contained any visible inclusions of chromite. The larger portion of this material was composed of grains varying in size from half to one and a half millimetres, the balance measuring two millimetres, together with a few measuring three and four millimetres in diameter.

Sub-portion e.—This weighed 3.0753 grams, and had a specific gravity of 15.332. It consisted of very irregular-shaped grains and pellets, about one-third of which measured two millimetres, and the remainder, which included a pellet measuring eight millimetres, three millimetres in diameter. All the grains and pellets composing this material were very much pitted, and contained a little imbedded chromite.

Analyses of these sub-portions showed them to have the following composition:—

	d.	e.
Platinum	81.17	75.14
Palladium	0.09	0.09
Rhodium	1.85	1.51
Iridium	0.76	1.36
Osmium	...	...
Copper	2.68	5.34
Iron	10.14	9.35
Osmiridium	2.58	5.21
Gangue (imbedded chromite).....	0.55	2.13
	99.82	100.13
Specific gravity....	16.789	15.332

The osmiridium found in these two sub-portions was, in both instances, present in the form of minute, thin, shining, steel-grey colored scales.

Here again, adding together the weights of the material comprising these two sub-portions, also the amounts found of each of the several constituents, calculation showed the magnetic portion of the ore, as a whole, to contain:—

Platinum	78.43
Palladium	0.09
Rhodium	1.76
Iridium	1.04
Osmium	...
Copper	3.89
Iron	9.78
Osmiridium	3.77
Gangue (imbedded chromite).....	1.27
	99.97
Specific gravity	16.095

The composition of the non-magnetic, as compared with that of the magnetic portion, was therefore as follows:—

	<i>Non-magnetic</i>	<i>Magnetic.</i>
Platinum	68.19	78.43
Palladium.....	0.26	0.09
Rhodium	3.10	1.70
Iridium.....	1.21	1.04
Osmium		
Copper	3.09	3.80
Iron.....	7.87	9.78
Osmiridium.....	14.62	3.77
Gangue (imbedded chromite)....	1.95	1.27
	100.29	99.97
Specific gravity.....	17.017	16.095

from which it will be seen, that the magnetic portion contained much less palladium and rhodium, and very considerably less included osmiridium, but contained somewhat more copper, nearly two per cent. more iron, and a little over ten per cent. more platinum, than the non-magnetic portion. On comparing the composition of the sub-portion *a*—which was not in the slightest degree magnetic,—with that of sub-portion *e*—which was magneti-polar—it will be observed that the difference in the percentage of iron is not very great, the latter containing barely half a per cent. more than the former. From this it might be inferred that the magnetic property of Portion II was not altogether, if indeed at all, dependent upon the amount of iron which it contained.

The weights of the material constituting sub-portions *a, b, c, d* and *e*, having been added together, as likewise the amounts of each of the several constituents found in these sub-portions—calculation showed the composition of this ore, after careful separation of the associated grains of foreign matter, taken as a whole, as determined upon the 17.894 grams material, to be as follows:—

Platinum	72.07
Palladium	0.19
Rhodium	2.57
Iridium	1.14
Osmium.....	
Copper	3.39
Iron	8.59
Osmiridium	10.51
Gangue (imbedded chromite)	1.69
	100.15
Specific gravity	16.656

In common with the native platinum of Oregon and Australia, this ore contains a large proportion of osmiridium, but differs from the material of those localities in that it contains a higher percentage of copper and iron, in which regard it more nearly approaches in composition to some Russian specimens of this mineral.

The following analyses of platinum ores, by Deville and Debray, are given for com-

parison with the foregoing (from which it will be remembered the associated gold was separated prior to analysis) :—

LOCALITY.	Oregon, N. America.	Australia.	California, N. America.	Choco, S. America.	Nischne Tagilsk, Ural, Russia.
Platinum	51.45	61.40	85.50	86.20	76.40
Palladium	0.15	1.80	0.60	0.50	1.40
Rhodium	0.65	1.85	1.00	1.40	0.30
Iridium	0.40	1.10	1.05	0.85	4.30
Copper	2.15	1.10	1.40	0.60	4.10
Iron	4.30	4.55	6.75	7.80	11.70
Gold	0.85	1.20	0.80	1.00	0.40
Osmiridium	37.30	26.00	1.10	0.95	0.50
Sand	3.00	1.20	2.95	0.95	1.40
	100.25	100.20	101.15	100.25	100.50

